US Army Corps of Engineers®
Engineer Research and Development Center

CRREL Instrumented Vehicle (CIV)

Description

The CRREL Instrumented Vehicle (CIV) is a sophisticated research vehicle developed for studying performance in cold regions environments. Originally a stock American Motors Corporation Jeep Cherokee, the CIV was reconfigured and instrumented to study all-season vehicle mobility. The CIV's instrumentation is continually being upgraded and enhanced.

CRREL Instrumented Vehicle.

Capabilities

The CIV can perform various mobility tests (traction, resistance, and maneuverability) using different tires, traction aids, and vehicle configurations on a range of terrain surfaces, including dry, wet, snow- and ice-covered pavement, and freezing–thawing ground. The data obtained from these tests are used to determine and predict vehicle performance on winter terrain.

The CIV is a valuable research tool in the following areas:

- Winter traction, rolling resistance, turning forces, and handling
- Traction coefficient of winter roadway and runway surfaces
- Traction aids (tire chains) for snow, ice, and frozen ground
- Tire efficiency and capability under winter conditions
- Off-road mobility on snow, ice, and frozen ground
- Vehicle mobility in combat operations support
- Mobility model development for vehicle design, operation, and procurement
- Environmental impacts of off-road and unsurfaced road traffic.

The CIV is instrumented to study all-season vehicle mobility.

Supporting Technology

- Velocity sensors for true wheel and vehicle speed
- Data acquisition system
- Configurable braking system and lockout hubs on each wheel
- Electronic inclinometer and triaxial accelerometers
- Control valves for front and rear brakes
- Triaxial load cells on each wheel
- Linear motion potentiometer to measure turning angles
- High-speed GPS
- Motion pack sensor for vehicle accelerations in three axes plus yaw, pitch, and roll rates.

Benefits

The CRREL Instrumented Vehicle is a sophisticated research instrument that offers customers hands-on, full-scale study of the effects of cold regions environments on the following:

- Traction
- Terrain resistance
- Vehicle handling and dynamics
- Model validation and development
- 3-dimensional force measurement at the tire/terrain interface.

Success Stories

- Predictive models have been developed for tactical and concept evaluation of vehicle mobility.
- Data sets have been developed to assist the Army in specifying tire types and operating configurations for military vehicles.
- Cooperative work with commercial industry has resulted in the development of new vehicles, modified mobility aids, and new techniques for winter mobility evaluation.

ERDC POC(s)

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